From:	PETERSON Jenn L
To:	Jeremy_Buck@fws.gov; Burt Shephard/R10/USEPA/US@EPA
Cc:	Eric Blischke/R10/USEPA/US@EPA; Bob Dexter; Joe Goulet/R10/USEPA/US@EPA; Jennifer Peers
Subject:	RE: Outline of approach to derive sediment PRGs from bird egg TRVs
Date:	03/16/2010 09:02 PM

I am glad you are pursuing bird egg PRGs - I think they are important. I am assuming you will do
the same approach for other chemicals, and not just DDE. I would also again point you all to
DEQ's guidance, which presents fish tissue acceptable tissue levels for protection of bird egg
using Jeremy's approach (BMFs), as well as sediment values using a BSAF.

Jennifer

-----Original Message-----
From: Jeremy_Buck@fws.gov [mailto:Jeremy_Buck@fws.gov]
Sent: Tue 3/16/2010 6:35 PM
To: Shephard.Burt@epamail.epa.gov
Cc: Blischke.Eric@epamail.epa.gov; Bob Dexter; Goulet.Joe@epamail.epa.gov; Jennifer Peers;
PETERSON Jenn L
Subject: Re: Outline of approach to derive sediment PRGs from bird egg TRVs

Hi Burt-

I have not seen LWGs rationale against the bird egg approach, other than
to say that the BMFs are variable. The most common way (and most direct)
to calculate fish tissue concentrations is to just divide the TRV by the
BMF to get the fish tissue concentration. Since we have site specific BMFs
from the Willamette River osprey data, I think this is the most
straightforward approach.   Egg concentrations are representative of all
of what the osprey or eagle have been eating, which is primarily fish (99%
for osprey and likely 80% to 90% for eagles during the breeding season)
typically within 1 mile of the nest site (some papers say 1 km).   Eagles
also eat some waterbirds (which also can obtain contaminated food from
eating fish prey from the river) and incorporate this material into the
eagle body fat, which is then deposited in egg (note that eagles have NOT
been reported scavenging in this area and mammal prey is quite low in diet
of Columbia River eagles, although pirating from osprey and gulls is
common).   Therefore, the egg "normalizes" the diet and is an expression of
what the dietary intake of the eagle or osprey is (at least for the part
the matters...the egg), since we are not concerned about concentrations in
the whole body or body parts of eagle or osprey.

So, the target fish concentration (value considered to be protective)
based on a NOAEL or LOAEL would be as follows:

TRV in egg:

	Osprey	Eagle
DDE	1.3 ppm	3.5 ppm
PCBs	3.0 ppm	4.5 ppm
Total TEQ	100 ppt	210 ppt

BMF from fish to egg:

	Osprey	Eagle
DDE	79	79
PCBs	8	8
Total TEQ	10	10

Target Fish concentration based on bald eagles (which would protect
ospreys as well as osprey TRVs are just a tad higher) NOTE: The resulting
fish concentrations are in PPB and NOT PPM, this is correct):

	NOAEL/BMF	LOAEL/BMF
DDE	1.3/79 = 16.5 ppb	3.5/79 = 44 ppb
PCBs	3.0/10 = 300 ppb	4.5/10 = 450 ppb
Total TEQ	100/10 =10 ppt	210/10 = 21 ppt

Using the protective target tissue concentration (NOAEL/BMF) for eagles
gets you the fish prey concentration that, on average, will be protective
of eagle individuals. Using the target fish concentrations (LOAEL/BMF)
gets you the fish prey concentration that, on average, will be protective
of the population of osprey.

Then, you can go use the target fish concentrations to the method you site
below to get to a sediment concentration.

I don't have any real objections to your approach proposed below, but
again I think we should use the empirical data rather than Kows (which
have been reported to be highly variable per chemical and have methodology
issues) as well as other estimates that will have an error associated with
them.

Thanks -Jeremy

Shephard.Burt@epamail.epa.gov
03/16/2010 09:33 AM

To
Jeremy_Buck@fws.gov, Blischke.Eric@epamail.epa.gov
cc

Goulet.Joe@epamail.epa.gov, peterson.jennifer@deq.state.or.us, Jennifer
Peers <JPeers@stratusconsulting.com>, Bob Dexter <bob@ridolfi.com>
Subject
Outline of approach to derive sediment PRGs from bird egg TRVs

Jeremy,

To counter LWG saying they can't derive sediment PRGs from bird egg
data, I've got a simple proposal for using the bird egg TRVs, which have
units of mg/kg of chemical in the egg, as a starting point to back
calculate sediment PRGs.

For the chemicals that biomagnify through a food web (PCBs, DDx, the
more highly chlorinated dioxin/furan congeners), start with the bird egg
TRV for each chemical of interest, then look up its log Kow value. For
a mixture such as total PCB we could use an average log Kow like was
done in the food web model, where we used a total PCB log Kow of 6.6.

Once you've got the log Kow, look up the food chain multiplier between
trophic levels 3 and 4 in the food chain multiplier table Larry Burkhard
developed for the Great Lakes water quality initiative. The bird egg
TRV gets divided by the food chain multiplier to derive a fish tissue
concentration that would result in accumulation of the egg TRV
concentration if the eagle or osprey ate fish with that predicted
chemical concentration. Once you've got the fish tissue concentration
that results in accumulation of the chemical to the bird egg TRV
concentration in a bird that eats fish, its a simple matter to either
use the food web model or BSAFs to back calculate the sediment
concentration resulting in accumulation of that fish tissue
concentration. Voila, instant bird egg based sediment PRG.

One could make the approach more site specific by back calculating a
site specific food chain multiplier by dividing, for example, the mean
measured bird egg residue by the mean measured fish tissue concentration
in the fish species that constitute the diet of eagles and osprey. The
egg TRV is then divided by the site specific food chain multiplier to
get the chemical concentration in fish. The back calculation from fish
concentration to sediment PRG is as before.

Unless you or someone else see some problems with this approach (I've
copied a few folks who may have a quick read on this as well as you), I
think we should direct LWG to use it to derive bird egg based sediment
PRGs for use in the feasibility study. I don't think we should accept
LWG saying they can't calculate an egg based PRG when there seems to be
a very straightforward approach for doing so. I wouldn't be surprised
to see a DDx sediment PRG developed in this manner being one of the
lowest, if not the lowest ecologically based sediment PRG for DDx, given
the sensitivity of birds to egg shell thinning and its subsequent
reproductive effects.

Best regards,

Burt Shephard
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"If your experiment needs statistics to analyze the results, then you
ought to have done a better experiment"
            - Ernest Rutherford